8532/6J4WA

High-Mu Triode

7-PIN MINIATURE TYPE

FRAME-GRID CONSTRUCTION **"PREMIUM" VERSION OF 6J4**

For Cathode-Drive UHF Amplifier Applications (up to 500 Mc) in Equipment Requiring Exceptional Stability and Reliability under Severe Environmental Conditions

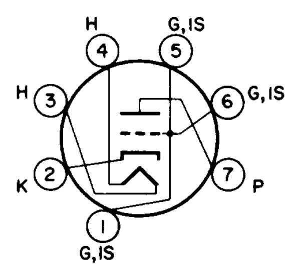
Electrical:

Heater Ratings and Characteristics:		
Voltage (AC or DC)	6.3 ± 0.3	volts
Current at heater volts = 6.3	0.400	amp
Peak heater-cathode voltage:		
Heater negative with respect to cathode	100 max.	volts
Heater positive with respect to cathode	100 max.	volts
Direct Interelectrode Capacitances:[a]		
Cathode to plate	0.2 max.	pf
Input (Cathode-drive operation):		
K to (G + IS, H)[b]	7.5	pf
Output (Cathode-drive operation):		
P to (G + IS, H)[b]	5.0 max.	pf
Grid and internal shield to plate	2.8	pf
Heater to cathode	2.8	pf

Mechanical:

Operating Position	Any
Type of Cathode	Coated Unipotential
Maximum Overall Length	2-1/8"
Maximum Seated Length	1-7/8"
Length, Base Seat to Bulb Top (Excluding tip)	1-1/2" ± 3/32"
Diameter	0.650" to 0.750"
Dimensional Outline (JEDEC No.5-2)	See *General Section*
Bulb	T5-1/2
Base	Small-Button Miniature 7-Pin (JEDEC No.E7-1)
Basing Designation for BOTTOM VIEW	7BQ

Pin 1 - Grid, Internal Shield
Pin 2 - Cathode
Pin 3 - Heater
Pin 4 - Heater
Pin 5 - Same as Pin 1
Pin 6 - Same as Pin 1
Pin 7 - Plate



Characteristics, Class A₁ Amplifier:

Plate Supply Voltage	150	volts
Grid	Connected to negative end of cathode resistor	
Cathode Resistor	100	ohms
Amplification Factor	52.5	
Plate Resistance (Approx.)	4800	ohms
Transconductance	11000	μmhos

Plate Current	13.5	ma
Grid Voltage (Approx.) for plate μa = 60	−15	volts

CLASS A$_1$ AMPLIFIER

Maximum Ratings, *Absolute-Maximum Values:*

For operation at altitudes up to 80,000 feet and frequencies up to 500 Mc

Plate Voltage	150	volts
Grid Voltage:		
Negative-bias value	55	volts
Positive-bias value	0	volts
Cathode Current	20	ma
Plate Dissipation	2.5	watts
Bulb Temperature (At hottest point on bulb surface)	120	°C

Maximum Circuit Values:

Grid-Circuit Resistance:		
For grid-resistor-bias operation	0.25	megohm

[a] With external shield JEDEC No.316 connected to ground except as noted.
[b] With external shield JEDEC No.316 connected to grid.

CHARACTERISTICS RANGE VALUES

	Note	*Min.*	*Max.*	
Heater Current	1	0.375	0.425	amp
Direct Interelectrode Capacitances:	2			
Cathode to plate	3	–	0.2	pf
Input (Cathode-drive operation): K to (G + IS, H)	4	5.5	9.5	pf
Output (Cathode-drive operation): P to (G + IS, H)	4	–	5.0	pf
Grid and Internal shield to plate	3	2.3	3.3	pf
Heater to cathode	3	1.0	4.5	pf
Plate Current (1)	1,5	9	18	ma
Plate Current (2)	1,6	–	60	μa
Transconductance (1)	1,5	8800	13200	μmhos
Transconductance (2) for an individual tube expressed as a per cent of Transconductance (1)	5,7	–	15	%
Reverse Grid Current	1,8	0	0.5	μa
Amplification Factor	1,5	40	65	
Heater-Cathode Leakage Current:				
Heater negative with respect to cathode	1,9	–	10	μa
Heater positive with respect to cathode	1,9	–	10	μa

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Leakage Resistance:				
Between grid and all other elements connected together	1,10	500	-	megohms
Between plate and all other elements connected together	1,11	500	-	megohms

Note 1: With ac or dc heater volts = 6.3.
Note 2: Measured in accordance with EIA Standard RS-191-A.
Note 3: With external shield JEDEC No.316 connected to ground.
Note 4: With external shield JEDEC No.316 connected to grid.
Note 5: With dc plate-supply volts = 150, grid connected to negative end of cathode resistor, cathode resistor (ohms) = 100, and cathode-bypass capacitor (μf) = 1000.
Note 6: With dc plate volts = 150 and dc grid volts = -15.
Note 7: With ac or dc heater volts = 5.7.
Note 8: With dc plate supply volts = 175, grid-circuit resistance (megohms) = 0.25, and cathode resistor (ohms) = 150.
Note 9: With dc heater-cathode volts = 100.
Note 10: With grid 100 volts negative with respect to all other elements connected together.
Note 11: With plate 300 volts negative with respect to all other elements connected together.

SPECIAL TESTS

High-Impact, Short-Duration Shock:

Peak Impact Acceleration	450	g
Duration of half-sine-wave mechanical-shock pulse	1	msec

This test is performed on sample tubes from each production lot to determine the ability of the tubes to withstand the specified acceleration for a short time interval. Tubes are rigidly mounted in each of four different positions (X_1, X_2, Y_1, and Y_2) in a Navy-Type High-Impact (Flyweight) Shock Machine and are subjected to 20 blows (5 in each position) under the following conditions; heater volts = 6.3, dc plate supply volts = 150, dc grid volts = -1.5, grid resistor (megohms) = 0.1, and dc heater-cathode volts = 100.

Tubes are then criticized for Transconductance change (1), Reverse Grid Current, and Heater-Cathode Leakage Current under the conditions specified in the CHARACTERISTICS RANGE VALUES and are subjected to the Constant-Frequency Vibration Test and the Continuity and Shorts Test described below.

Fatigue Vibration:

Peak Vibrational Acceleration	5	g
Vibration Frequency	25	cps
Duration of Test	96	hours

This test is performed periodically on sample tubes to determine the ability of the tubes to withstand the specified acceleration at a constant vibration frequency for an extended time interval. Tubes are rigidly mounted on a platform vibrating with simple harmonic motion at a constant vibration frequency of 25 cps and, with heater volts = 6.3, are subjected to the specified acceleration for 96 hours (32 hours in each of three different positions X_1, X_2, and Y_1).

Tubes are then criticized for changes in Transconductance (I), Reverse Grid Current, and Heater-Cathode Leakage Current under the conditions specified in the CHARACTERISTICS RANGE VALUES and are subjected to the Constant-Frequency Vibration Test and the Continuity and Shorts Test described below.

Constant-Frequency Vibration:

Peak Vibrational Acceleration	10	g
Vibration Frequency	40	cps
RMS Voltage across plate load resistor.	150 max.	mv

This test is performed on sample tubes from each production lot to determine if loose parts or mechanical resonance are present at the specified acceleration and vibration frequency. Tubes are rigidly mounted on a platform vibrating with simple harmonic motion at a constant frequency of 40 cps and, with the tubes operating under the conditions specified in the CHARACTERISTICS RANGE VALUES for Transconductance (I) with the addition of a plate load resistor of 2000 ohms, are subjected to the specified acceleration. During this test, the rms voltage across the plate load resistor must not exceed 150 millivolts.

Variable-Frequency Vibration:

Peak Vibrational Acceleration	10	g
Vibration-Frequency Range	50 to 500	cps
RMS Voltage across plate load resistor. . . .	100 max.	mv

This test is performed periodically on sample tubes to determine if mechanical resonance is present at the specified acceleration over the specified frequency range. Tubes are rigidly mounted on a platform vibrating with simple harmonic motion over a frequency range of 50 to 500 cps and, with the tubes operating under the conditions specified in the CHARACTERISTICS RANGE VALUES for Transconductance (I) with the addition of a plate load resistor of 2000 ohms, are subjected to the specified acceleration in each of two different positions, X_1 and X_2. The acceleration over the frequency range is within ±20 per cent of the reference acceleration at 100 cps. The frequency is increased from 50 to 500 cps with approximately logarithmic progression and 4 to 5 minutes are required to traverse the frequency range. During this test, the rms voltage across the plate load resistor must not exceed 100 millivolts.

High-Altitude Voltage Breakdown:

Effective Altitude.	80000	ft
Air Pressure.	21 ± 2	mm Hg
Ambient Temperature	25 ± 5	^{o}C
RMS Voltage between plate base pin and adjacent pins.	500	volts

This test is performed periodically on sample tubes from each production lot to determine the ability of the tubes to withstand high-altitude (low-air-pressure) conditions. In this test at an ambient temperature of $25^{o} \pm 5^{o}$ C, while the tubes

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are subjected to a reduced air pressure of 21 ± 2 mm Hg corresponding to an altitude of 80,000 feet, a 60-cps, ac rms voltage of 500 volts is applied between the plate base pin and adjacent pins. Tubes must not break down (arc over) or show evidence of corona.

Continuity and Shorts:

This test is performed periodically on sample tubes from each production lot to determine the presence of open circuits, temporary or permanent shorts, or air leaks. Tubes are subjected to the Thyratron-Type Shorts Test described in Military Specification MIL-E-1E, method 1201.

Heater-Cycling Life:

Duration of Test. . . . . 2000 cycles

This test is performed on sample tubes from each production lot with heater volts = 7.0 cycled 1 minute ON and 4 minutes OFF for 2000 cycles, dc heater-cathode volts = 100 continuously ON, and no voltages applied to the plate or grid. After 2000 cycles, tubes are criticized for changes in Heater-Cathode Leakage Current and Leakage Resistance, and for Open Heaters, Open Cathode Circuits, and Heater-Cathode Shorts.

Stability Life (20 Hours):

This test is performed at room temperature on sample tubes from each production lot to determine if the tubes are stable. After 2 hours and again after 20 hours of operation under the conditions specified in the CHARACTERISTICS RANGE VALUES for Transconductance (1) with the addition of a grid resistor of 0.25 megohm and with dc heater-cathode volts = 100, tubes are criticized for the change in Transconductance (1).

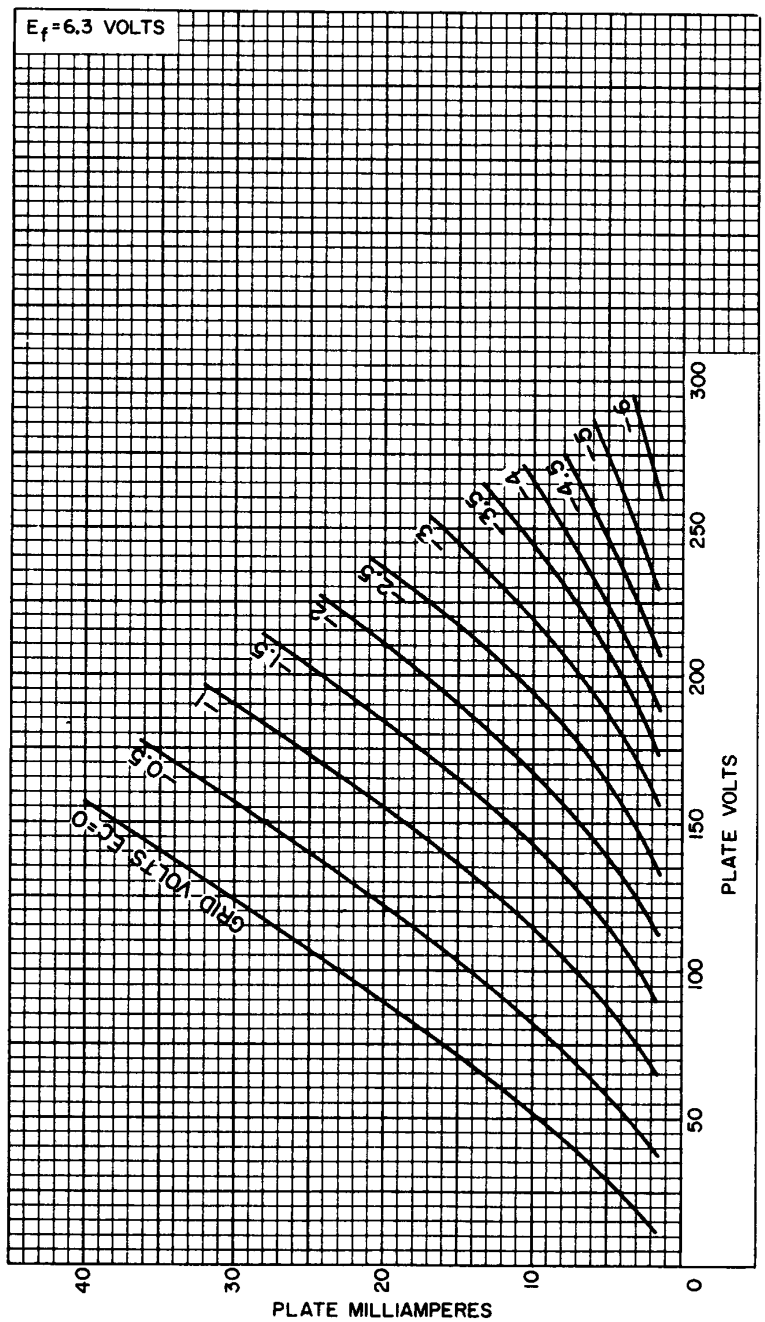
Early-Hour Survival-Rate Life (100 Hours):

This test is performed on sample tubes from each production lot to assure a high early-hour survival rate. After 100 hours of operation under the conditions specified for the Stability Life Test above, tubes are criticized for the change in Transconductance (1) and are then subjected to the Continuity and Shorts Test.

Intermittent-Conduction Life (1000 Hours):

This test is performed on sample tubes from each production lot to assure the high quality of individual tubes and to guard against epidemic failures due to excessive transconductance change in any of the characteristics specified below. After 500 hours of operation under the conditions specified for the Stability Life Test above and, in addition, with heater voltage cycled 110 minutes ON and 10 minutes OFF, and bulb temperature = 120° C, tubes are criticized for changes in Heater Current, Transconductance (1), Transconductance (2), Reverse Grid Current, Heater-Cathode Leakage Current, Leakage Resistance, and for Open Circuits, Permanent Shorts, Air Leaks, and Total Defectives. After 1000 hours of operation, tubes are again criticized for all of the preceding defects with the exception of the change in Transconductance (2).

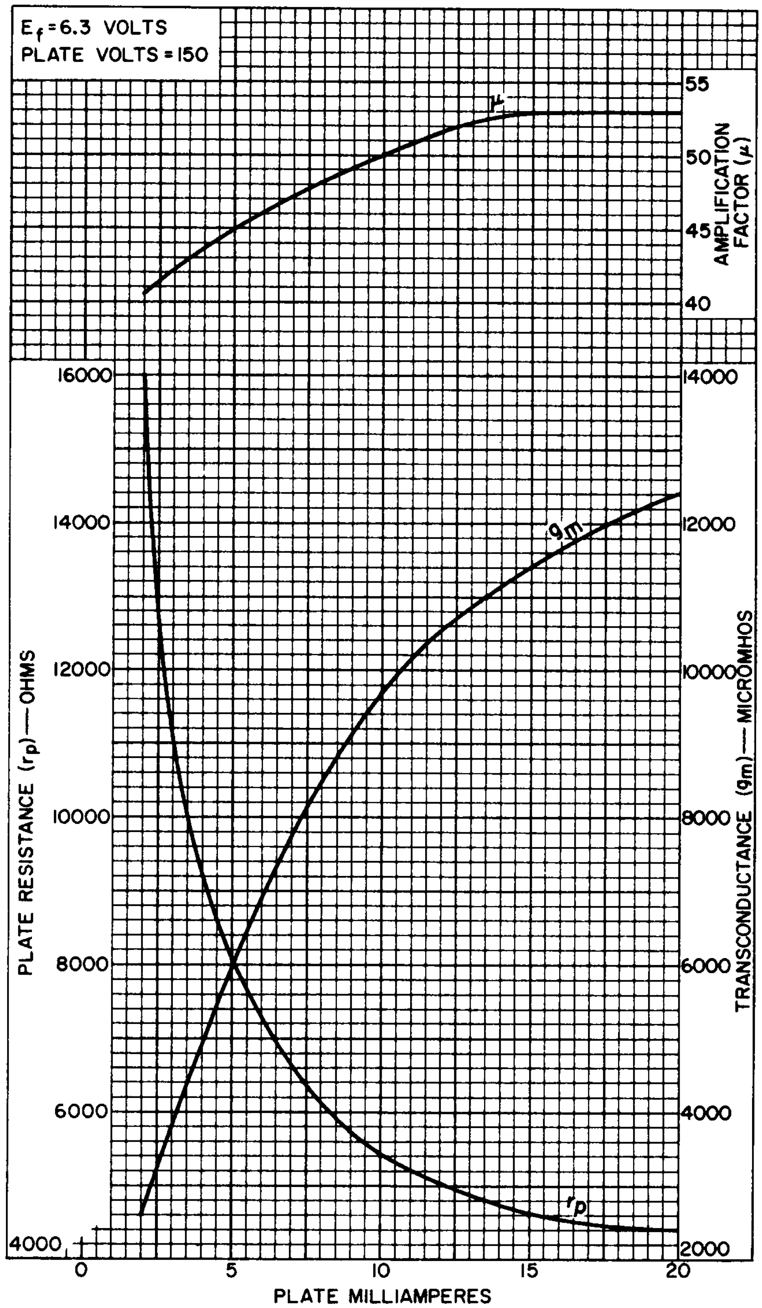
AVERAGE PLATE CHARACTERISTICS



92CM-12534

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AVERAGE CHARACTERISTICS



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